

HOSTED BY



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

journal homepage: <http://www.elsevier.com/journals/international-journal-of-nursing-sciences/2352-0132>

## Original Article

# Development and initial validation of the child intermittent Exotropia Questionnaire among child strabismus patients



Wei Bian <sup>a</sup>, Yan Wu <sup>a,b,\*</sup>, Yang Liu <sup>a</sup>, Junli Wan <sup>a</sup>, Yan Xu <sup>a</sup>,  
Mingqiong Tan <sup>a</sup>

<sup>a</sup> Southwest Eye Hospital, Third Military Medical University, Chongqing, China

<sup>b</sup> School of Nursing, Third Military Medical University, Chongqing, China

## ARTICLE INFO

## Article history:

Received 15 October 2014

Received in revised form

12 January 2015

Accepted 15 January 2015

Available online 5 March 2015

## Keywords:

Child strabismus

Quality of life

Questionnaire

Reliability

Validity

## ABSTRACT

**Objectives:** To translate the Child Intermittent Exotropia Questionnaire (Child-IXTQ) from English to Chinese and to evaluate its reliability and validity in Chinese childhood strabismus patients.

**Method:** A consecutive sample of 143 child strabismus patients was recruited from the Department of Ophthalmology at a medical center in Southwest China. In addition, 100 visually normal adults and 100 patients with other eye diseases were recruited. The Brislin translation model was followed to develop the Chinese version of Child-IXTQ. Reliability was established using Cronbach's  $\alpha$  and test-retest. Validity was established encompassing content validity, construct validity, convergent validity, criterion-related validity and discriminative validity.

**Results:** The correlation coefficients between each item score with the total score ranged from 0.370 to 0.813. Two subscales were extracted by principal component analysis, with a content validity of 0.91. The correlation coefficients between two factor scores with the total score were 0.709 and 0.939. Criterion-related validity was estimated by the correlating the Child-IXTQ with the PedsQL 4.0, and the correlation coefficient was 0.522. In addition, the Child-IXTQ discriminated accurately between strabismus patients and normal children, or children with other eye diseases that possessed good discriminative validity. Cronbach's  $\alpha$  coefficient for the internal consistency was 0.907 and the test-retest reliability was 0.962.

**Conclusions:** Our study indicates that the Child-IXTQ is a reliable and valid instrument for assessing the health-related quality of life among children with strabismus.

Copyright © 2015, Chinese Nursing Association. Production and hosting by Elsevier (Singapore) Pte Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

\* Corresponding author.

E-mail address: [hwuy2001@sina.com](mailto:hwuy2001@sina.com) (Y. Wu).

Peer review under responsibility of Chinese Nursing Association.

<http://dx.doi.org/10.1016/j.ijnss.2015.02.004>

2352-0132/Copyright © 2015, Chinese Nursing Association. Production and hosting by Elsevier (Singapore) Pte Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## 1. Introduction

With the establishment of a biological – psychological – social medicine model, the measurement of changes in visual function do not fully reflect the impact of disease on patients, and has exposed the limitations of traditional visual evaluation methods in ophthalmology. In the 1980s, the concept of health-related quality of life (HRQOL) was introduced to ophthalmology, and subsequently became an international focus of research. HRQOL aims not only to provide comprehensive information for medical workers, but also to develop new methods to evaluate the effect of the ophthalmic intervention [1].

Strabismus is a common ocular symptom in which the eyes are not properly aligned and point in different directions. It has a reported prevalence of 3%–4% among children [2], and can cause visual dysfunction, self-image disorders, low self-esteem, social problems and loneliness, which in turn can seriously affect quality of life [3–6]. To compound matters, children as young as five or six years of age may react negatively to peers with obvious strabismus [7–9]. Accordingly, improving the care of childhood strabismus patients requires a full assessment of quality of life prior to intervention, so that treatment can be appropriately planned and effectively evaluated. Despite this, no disease-specific instrument exists that can be used to evaluate the quality of life of children with strabismus in China. Recently, a patient-derived and specific HRQOL Child intermittent Exotropia Questionnaire (Child-IXTQ) was developed that has been shown to be a valid and reliable instrument in several studies [10–13]. Child-IXTQ not only reflects the influence of visual problems on physical, psychological and emotional functioning, but also provides an evidence-based foundation for personalized treatment and nursing intervention for intermittent exotropic children. Here we report the development of a Chinese version of the Child-IXTQ, and a study of its reliability and validity among childhood strabismus patients in China.

## 2. Methods

### 2.1. Subjects

143 Child strabismus patients were recruited from the Department of Ophthalmology of the Southwest Hospital in Chongqing of China during the data collection period. All of them were also asked to complete the Chinese version Pediatric Quality of Life Inventory 4.0. Inclusion criteria were as follows: (1) age of 8–17 years old; (2) ability to express themselves freely; (3) not taking any anti-anxiety or antidepressant drugs; (4) no surgery or other treatment for strabismus prior to recruitment; (5) no other facial or ocular abnormalities or acute eye diseases; and (6) the angle of deviation by prism was equal to or greater than 15 prism diopters (PD).

The visually normal sample consisted of 100 students with no history of strabismus. The 100 patients with other eye diseases included those treated for retinal detachment ( $n = 46$ ), cataract ( $n = 32$ ), glaucoma ( $n = 12$ ), or ocular trauma ( $n = 10$ ). These patients had no history of strabismus or

amblyopia. There were no statistically significant differences between the three study groups with respect to distribution of age, gender, marital status, or education.

Approval was obtained from the hospital's research ethics committee, and informed consent was obtained from all subjects.

### 2.2. Instruments

#### 2.2.1. Child intermittent Exotropia Questionnaire (Child-IXTQ)

Child-IXTQ is a strabismus-specific questionnaire with a total of 12 items. Each subscale consists of 10 items rated on the 5-point Likert-type scale for all the responses: never (score 100), rarely (score 75), sometimes (score 50), often (score 25), and always (score 0), respectively. The overall score is the mean of all the questions answered. The best-possible score is 100 indicating the best quality of life, while the worst is 0, indicating the worst HRQOL. For the original English version of Child-IXTQ, the Cronbach's  $\alpha$  was 0.93. Compared with other generic HPQOL instruments, Child-IXTQ is more sensitive to subnormal quality of life, and can accurately discriminate between strabismus children, visually normal children, and children with other eye diseases [10,11].

#### 2.2.2. Pediatric Quality of Life Inventory 4.0 (PedsQL 4.0)

The PedsQL 4.0 questionnaire was developed by Varni and colleagues in 2001 to assess quality of life in healthy children [14], as well as those with acute and chronic diseases. It consists of a total of 23 items in 4 subscales: Physiological, Emotional, Social and Role Function. The PedsQL 4.0 has been translated into many languages, and is widely used in the clinic in testing the quality of life in children, as well as in decision making for medical and nursing intervention [14–16]. The Chinese version of PedsQL 4.0 showed a good reliability and validity. The correlation coefficients between each item score with the total score ranged from 0.255 to 0.800, and the Cronbach's  $\alpha$  coefficient for the internal consistency ranged from 0.74 to 0.82 [17]. The option for each item has possible scores of 0, 25, 50, 75, and 100, ranging from worst to best, respectively. The total score is calculated by averaging all of the items' responses, with a higher score indicating better QOL.

### 2.3. Development and translation of the questionnaire

The standard forward-backward translation procedure was followed to develop the Chinese version of Child-IXTQ. Permission was obtained from Professor Hatt SR [10] who holds the copyright for the Child-IXTQ. Two masters of ophthalmology translated the questionnaire from English into Chinese according to the Brislin translation model. Subsequently, an expert panel was convened consisting of six professionals: three ophthalmologic experts, two nursing experts and one psychological expert. The panel held a rigorous discussion on the content, semantics, technical equivalence and cultural linguistics of the translated questionnaire, before reaching a consensus on a final Chinese version. Then, two bilingual experts (fluent in two languages and who had lived in each country for almost one year) performed blind

backward translation of the scale, critically compared these with the original English version, and revised them to generate a formal Chinese version of the Child-IXTQ. Thirty child strabismus patients were recruited for a pilot test to finalize the Child-IXTQ in Chinese.

#### 2.4. Data collection

Data were collected at the first day of hospitalization before surgery and each child strabismus patient was given informed consent before participating. To reduce bias, participants were given instructions in completing the Child-IXTQ and PedsQL 4.0 before being left alone in a room. Fifty patients were chosen randomly to complete Child-IXTQ for a second time three days following the first survey.

#### 2.5. Data analysis

Internal consistency, test-retest reliability, split-half reliability, content validity, criterion-related validity, construct validity and responsibility were all assessed. Internal consistency was established by calculating the Cronbach's  $\alpha$  coefficient and test-retest reliability was estimated by the intra-class correlation coefficient. Content validity was assessed by using a panel of experts and discriminative validity was assessed by comparing the median scores of the child strabismus patients with normal children or children with other eye diseases using the Mann–Whitney U test. The correlation of the Child-IXTQ and PedsQL 4.0 questionnaire was used to test the criterion-related validity by Spearman correlation coefficient. Data analyses were carried out using SPSS (SPSS, Version 15.0). A 5% level of significance was used on all the analyses.

### 3. Results

#### 3.1. Demographic data

All 143 child strabismus patients participating in the test returned questionnaires, corresponding to a response rate of 100%. Demographic and disease-related characteristics data of all the participants are shown in Table 1.

The median angle of deviation measured at a distance by a prism and an alternating cover test (PACT) was 50 prism diopters (PD; range, 15–80) for the 78 patients with primary esodeviation. Patients with primary exodeviation ( $n = 47$ ) had a median PACT of 48 PD (range 15–74), and 18 patients with vertical deviation had a median PACT of 18 PD (range 8–45).

All visually normal patients and those with other eye diseases returned valid questionnaires, and had no more than 10 PD of horizontal and 1 PD of vertical heterophoria. In the normal subjects, stereoacuity was 40–80 seconds of arc using the TNO test, and the best corrected visual acuity was at least 20/25 (median 20/20 for each eye).

#### 3.2. Judgment in items analysis

The extreme group analysis and correlation analysis methods were used for judgment in items analysis. The extreme group

**Table 1 – Characteristics of the participants ( $n = 180$ ).**

	Strabismus children ( $n = 143$ )	Normal children ( $n = 100$ )	Children with other eye diseases ( $n = 100$ )
<b>Gender</b>			
Boy	76	54	52
Girl	67	46	48
<b>Education</b>			
Primary school or lower	62	43	39
Middle school	30	23	25
High school	51	34	36
<b>Living geographic location</b>			
City/town	52	41	43
Countryside	91	59	57
<b>With double vision</b>			
Yes	68	0	0
No	75	100	100
<b>Type of strabismus</b>			
Exotropia	47	–	–
Esotropia	78	–	–
Vertical deviation	18	–	–

analysis was required to categorize the subjects into two categories according to the scores, that is, the highest 27% comprises the high score group, and the lowest 27% is the low score group. Scores between them are then compared using the rank-sum test. Differences between the scores for the two groups of all items were significantly discriminative ( $p < 0.001$ ).

The correlation analysis turned out the coefficient correlation between each item and the total score was 0.370–0.813 ( $p < 0.01$ ).

This analysis method indicated that all items were discriminative and that the correlation between the items and total scores reached statistical significance.

#### 3.3. Validity

##### 3.3.1. Content validity

The content validity was determined using the content validity index (CVI) with a 4-point Likert scale, ranging from 1 = not relevant to 4 = very relevant. The Chinese version was submitted to a panel of six experts who were informed of the instrument's purpose, connotation and the concepts to rate each item of the questionnaire, and CVI was the percentage of total items rated by the experts as either 3 or 4. The expert panel demonstrated that the Child-IXTQ questionnaire was conceptually and culturally relevant to evaluate the health-related quality of life among child strabismus patients in China, and the average CVI was 0.93 for the total scale, indicating satisfactory content validity.

##### 3.3.2. Construct validity

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.813, with a Bartlett's spherical test value of 627.290 ( $p < 0.001$ ), indicating that the use of principal component analysis was appropriate for all the data. Two factors with eigenvalues greater than 1.0 were extracted, explaining

60.013% of the total variance. When the total variance was examined, the 1st factor, 'Psychosocial' (which measures the psychosocial functioning and self-awareness) accounted for 39.031% of the total variance, and the 2nd factor, 'Function', which includes vision related functions, accounted for 20.981%. All items demonstrated strong loading on one of the two factors ( $>0.4$ ; Table 2).

### 3.3.3. Convergent validity

The correlation coefficient was taken to verify the convergent validity of both scores of each subscale and the total score. Table 3 shows that the Child-IXTQ presented adequate convergent validity, a high correlation between the score of the two subscales with the total index score ( $r = 0.709$ ,  $0.939$ ,  $p < 0.01$ ), and relatively moderate correlation between the scores of the two subscales ( $r = 0.458$ ,  $p < 0.01$ ).

### 3.3.4. Discriminative validity

Discriminative validity was based on the theoretical considerations using the known-group technique to compare median scores per group on Child-IXTQ using Mann–Whitney (Fig. 1). The median score of the child strabismus patients was lower compared with the normal children or children with other eye diseases on the total scale, psychosocial and function subscales ( $P < 0.01$ ).

### 3.3.5. Criterion-related validity

The criterion-related validity was based on the correlation coefficient between the Child-IXTQ and the PedsQL 4.0

**Table 3 – Correlations between scores for each scale and the total score.**

Description	Psychosocial	Function
Psychosocial	1	–
Function	0.458**	1
Total score	0.939**	0.709**
Spearman coefficient test. ** $P < 0.01$ .		

questionnaire, which is the global standard questionnaire for testing the quality of life for all the child strabismus patients. Moderate positive correlations were obtained with the PedsQL 4.0 ( $r = 0.522$ ,  $p < 0.01$ ). Moreover, the subscale scores of the Child-IXTQ significantly correlated with the subscale scores of PedsQL 4.0 (correlation coefficients ranged from 0.354 to 0.672, all  $p < 0.01$ ).

### 3.4. Reliability

The Cronbach's  $\alpha$  coefficient for all 20 items of AS-20 was 0.907, indicating high internal consistency or homogeneity for the scale. As for the subscale, the values of the psychosocial and function subscales were 0.849 and 0.915. For the test-retest reliability, the ICC coefficients ranged from 0.730 to 0.953 for all the items and 0.962 for the overall score.

## 4. Discussion

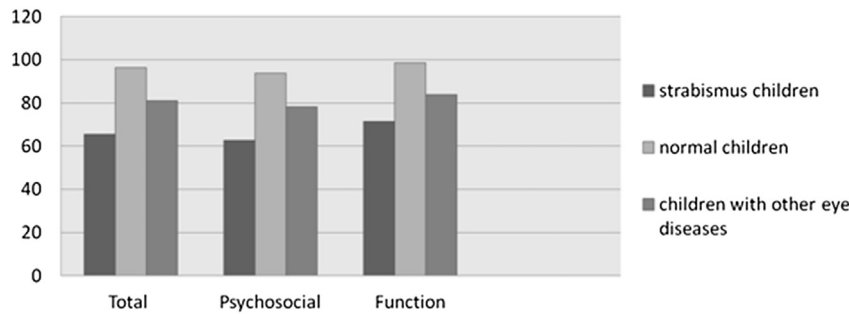
### 4.1. The importance and value of the Child-IXTQ

The eyes are one of the most important sensory organs in human body, and 80%–90% of the information from the environment is perceived through the visual system [18]. The performance of the visual system plays a significant role in a person's learning, working, and social functions, and impacts family life and social roles, as well as economic and psychological status. Strabismus is a common clinical syndrome characterized by cosmetic visible misalignment of the eyes and altered depth perception, and which affects HRQOL of children and teenagers [19]. Children are at a crucial period of growth, both physically and mentally, and their minds are immature and unstable. Teasing by other children can have a negative effect on the shaping of their personalities, resulting in responses that are self-abasing and autistic, and possibly even hostile towards society at large [20]. In contrast to studies of HRQOL in children with ophthalmic cancers or other chronic diseases however, quality of life among Chinese children with strabismus has not been sufficiently studied. Moreover, the study of HRQOL for in child strabismus patients is hampered by the lack of an effective measurement tool that is simple to complete, accurate in assessing HRQOL, and sensitive to changes. Currently, Child –IXTQ [10] is the most widely used quality of life assessment scale for strabismic children in countries outside China. It has been applied to assessment of quality of life and intervention outcomes among clinically strabismic children between the ages of 8–17 years old [10–13]. The questionnaire is less applicable to younger children however, who may misunderstand the

**Table 2 – Factor loading, eigenvalues, and percent of variance for Child –IXTQ items emerging from the principal components analysis.**

Items	Factors loading	
	Psychosocial	Function
1. I worry about my eyes	0.819	
2. It bothers me that people wonder what is wrong with my eyes	0.738	
3. I feel different from other kids because my eyes go in and out.	0.719	
4. Kids tease me because of my eyes.	0.692	
5. My eyes make it hard for me to make friends.	0.662	
6. I worry about what other people think of me because of my eyes.	0.640	
7. I am bothered when my parents say things about my eyes.	0.633	
8. I am bothered when grownups say things about my eyes.	0.612	
9. I was bothered because I could not see clearly.		0.574
10. It bothers me that I have to shut one eye when it is sunny.		0.666
11. My eyes make it hard to look people in the eye.		0.506
12. It is hard to concentrate because of my eyes.		0.647
Eigenvalues	4.684	2.518
Variance explained (%)	39.031%	20.981%
Cumulative variance explained (%)	39.031%	60.013%





**Fig. 1 – Comparison of mean scores of child strabismus patients versus visually normal children and children with other eye diseases.**

content of some entry options, or may not grasp the differences between the Likert 5 ratings. Moreover children may refuse to accept the survey or selectively fill out the contents of the scale, thereby invalidating their responses. Accordingly, and consistent with the design of previous studies, the inclusion criteria for the strabismic children participating in the current study was 8–17 years old. In order to quantify the HRQOL another other psychometric properties among the child strabismus patients, and to provide evidence for further medical intervention and nursing program development, we introduced a disease-specific instrument based upon culturally and socially sensitive translation of a previously-existing test.

#### 4.2. Validity

The overall validity was supported by content, construct, convergent, criterion-related, and discriminative validities.

For content validity, a panel of experts noted that the Child-IXTQ was short, reliable, discriminative and stable instrument for evaluating. However, one item was not universally applicable to the current Chinese culture and expression (i.e. question 9: It bothers me because I have to wait for my eyes to clear up.), and was changed to 'I was bothered because I could not see clearly.' to make it easier for children to understand. The CVI of the total scale of the revised Chinese Child-IXTQ was 0.93, indicating that it was conceptually and culturally relevant for assessing the health-related quality of life among strabismic children.

Convergent validity was supported by the correlation between the scores of each subscale and the total score. There was a moderate correlation between the scores of the two subscales, providing evidence that HRQOL of the strabismic children includes a range of aspects, and that both components were independent aspects of HRQOL. A high correlation was found between the score of each subscale with the total index score, indicating homogeneity between them in measuring Health-related quality of life.

Our findings with respect to the two factors that explained most of the total variance, namely 'Psychosocial' and 'Function', were different from those of Hatt and colleagues [10]. This difference may be explained on the basis that American children advocate open education, emphasizing the development of personality, strengthening of self-awareness and an

independent lifestyle. As a consequence, a greater emphasis is placed in American society on inner feelings and experiences [21]. In contrast, Chinese children are exposed to an enclosed style education characterized by parental surveillance and a rigorous lifestyle. As a consequence, they tend to ignore or fail to express their true feelings, placing a greater stress on the phenomenon itself rather than their subjective emotional experiences [17]. Another potential source of discrepancy is the fact that Hatt's study was limited to children with intermittent strabismus, whereas ours encompassed all types of childhood strabismus.

The Chinese version of PedsQL 4.0 has been recently developed and is widely used in assessing quality of life in children. We chose PedsQL 4.0 as Criterion-related validity since the two questionnaires are similar in design and options. Additionally, there is no specific child strabismus instrument that can be considered as a 'gold standard' in China. The correlation coefficient between the Child-IXTQ and PedsQL 4.0 was 0.517, indicating good criterion-related validity.

Discriminative validity was supported by the differences of the median score between strabismus patients and normal adults or patients with other eye diseases, and a significant difference was found between groups. The results showed that the strabismic children had a lower mean HRQOL score compared with normal children and children with other eye diseases, which was consistent with the results of Hatt [10]. This suggests that many problems experienced by child strabismus patients are related to poorer visual acuity. Moreover, the Child-IXTQ includes QOL-related items that are concerned not only with visual acuity, but also with appearance disorders, social barriers and communication problems that may not be apparent among normal children or children with other eye diseases. In addition, the scores of psychosocial subscale were significantly lower than the function subscale. This may be explained on the basis that the Chinese advocate a high degree of social evaluation and recognition, and their main concern is with the view of others rather than the condition itself.

#### 4.3. Reliability

The reliability of the questionnaire is supported by high internal consistency (Cronbach's  $\alpha$ ), namely, 0.907 for the total

scale, and ranging from 0.849 to 0.915 for the subscales of the Child-IXTQ. The value was consistent with the widely used original English version which was 0.93 for the total scale [9]. The test-retest reliability ranged from 0.730 to 0.953, demonstrating its high stability over time.

A number of study limitations should be considered. Firstly, we used a small sample size to test the reliability and validity of the Child-IXTQ. Another limitation is that the strabismic children came to the hospital for the surgery because they or their parents were not satisfied with their appearance or had lower self-esteem; accordingly, our result may not reflect the quality of life of strabismic children as a whole in Chinese society. The third limitation was the difference in proportions of the objects with diplopia, which has been previously shown to affect quality of life among strabismus subjects [8]. One possible approach in a future study will be to divide the strabismus patients into subjects with or without the diplopia. In spite of its limitations, the Child-IXTQ emphasized the importance of assessing HRQOL among strabismus children, which in turn can significantly promote care of these individuals.

Future studies will evaluate the psychometric properties of the Chinese version of Child-IXTQ in a larger sample, and will compare its performance with other types of research methods, including Rasch analysis and confirmatory factor analysis.

## 5. Conclusions

To our knowledge this is the first use of a strabismus-specific questionnaire to evaluate the quality of life of in children with strabismus in China. The findings of our study confirmed the reliability, validity and feasibility of the Child-IXTQ questionnaire for clinical use among strabismic children. In addition, the Chinese version of Child-IXTQ questionnaire may be an important tool to provide accurate information to increase understanding and develop improved therapeutic options for this condition.

## Conflicts of interest

The authors declare no potential conflicts of interest with respect to the research and/or publication of this article.

## Funding

This study was funded by the Clinical Care Technology Innovation Fund (201202) for projects at the Southwest Hospital.

## Ethical approval

Approval was obtained from the hospital's research ethics committee.

## REFERENCES

- [1] Testa MA, Simonson DC. Assessment of quality-of-life outcomes. *N Engl J Med* 1996;334:835–40.
- [2] Kan-xing Zhao, Xue-feng Shi. Progress in research of strabismus and amblyopia in China in the new century. *Chin J Ophthalmol* 2005;41(8):729.
- [3] Sabri K, Knapp CM, Thompson JR, Gottlob I. The VF-14 and psychological impact of amblyopia and strabismus. *Invest Ophthalmol Vis Sci* 2006;47(10):1386–92.
- [4] Lukman H, Kiat JE, Ganesan A, Chua WL, Khor KL, Choong YF. Negative social reaction to strabismus in school children ages 8–12 years. *J AAPOS* 2011;15(3):238–40.
- [5] Nelson BA, Gunton KB, Lasker JN, Nelson LB, Drohan LA. The psychosocial aspects of strabismus in teenagers and adults and the impact of surgical correction. *J AAPOS* 2008;12(1):72–6.
- [6] Johns HA, Manny RE, Fern KD, Hu YS. The effect of strabismus on a young child's selection of a playmate. *Ophthalmic Physiol Opt* 2005;25(5):400–7.
- [7] Lukman H, Kiat JE, Ganesan A, Chua WL, Khor KL, Choong YF. Strabismus-related prejudice in 5–6-year-old children. *Br J Ophthalmol* 2010;94(10):1348–51.
- [8] Menon V, Saha J, Tandon R, Mehta M, Khokhar S. Study of the psychosocial aspects of strabismus. *J Pediatr Ophthalmol Strabismus* 2002;39(4):203.
- [9] Olitsky SE, Sudesh S, Graziano A, Hamblen J, Brooks SE, Shaha SH. The negative psychosocial impact of strabismus in adults. *J AAPOS* 1999;3(4):209–11.
- [10] Hatt SR, Leske DA, Yamada T, Bradley EA, Cole SR, Holmes JM. Development and initial validation of quality-of-life questionnaires for intermittent exotropia. *Ophthalmology* 2010;117(1):163–8.
- [11] Hatt SR, Leske DA, Holmes JM. Comparison of quality-of-life instruments in childhood intermittent exotropia. *J AAPOS* 2010;14(3):221–6.
- [12] Yamada T, Hatt SR, Leske DA, Holmes JM. Spectacle wear in children reduces parental health-related quality of life. *J AAPOS* 2011;15(1):24–8.
- [13] Yamada T, Hatt SR, Leske DA, Holmes JM. Health-related quality of life in parents of children with intermittent exotropia. *J AAPOS* 2011;15(2):135–9.
- [14] Varni JW, Seid M, Kurtin PS. PedsQL 4.0: reliability and validity of the pediatric quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. *Med Care* 2001;39(8):800–2.
- [15] Varni JW, Seid M, Knight TS, Uzark K, Szer IS. The PedsQL 4.0 generic core Scales: sensitivity, responsiveness, and impact on clinical decision making. *J Behav Med* 2002;25(2):175–93.
- [16] Varni JW, Burwinkle TM, Katz ER, Meeske K, Dickinson P. The PedsQL in pediatric cancer: reliability and validity of the pediatric quality of life inventory generic core scales, multidimensional fatigue scale, and cancer module. *Cancer* 2002;94(7):2090–106.
- [17] Lu YY, Tian Q, Hao YT, Jing J, Lin YD, Huang DQ. Reliability and validity for chinese version of pediatric quality of life inventory PedsQL4.0. *J Sun Yat Sen University(Medical Sciences)* 2008;29(3):328–31.
- [18] Zhou LL, Li QZ, Cai JH. Measurement and application for quality of life in ophthalmology. *J Traditional Chin Ophthalmol* 2006;16(3):183–5.
- [19] Wen G, McKean-Cowdin R, Varma R, Tarczy-Hornoch K, Cotter SA, Borchert M, et al. General Health-related quality of life in preschool children with strabismus or amblyopia. *Ophthalmology* 2001;118(3):574–80.

- [20] Liang P, Xie LN, Wang F. Misunderstandings and countermeasures about strabismus and amblyopia. *Acta Univ Med Nanjing* 2001;12(3):245–7.
- [21] Hatt SR, Leske DA, Adam WE, Kirgis PA, Bradley EA, Holmes JM. Quality of life in intermittent exotropia: child and parent concerns. *Arch Ophthalmol* 2008;126(11):1525–9.